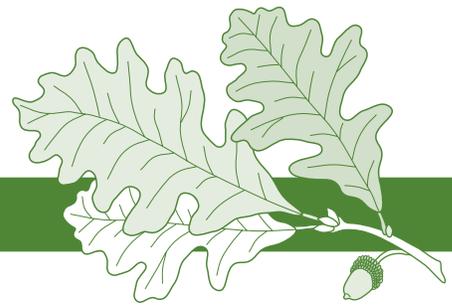


# Tree Planting: Establishment and Care



Millions of trees are planted on both private and public lands in Iowa. Purposes for planting trees include timber production, fiber production, erosion control, wildlife habitat improvement, riparian buffer creation, improvement of stocking or composition in open woodlands, Christmas tree production, shelterbelt establishment, fuelwood production, watershed protection, energy conservation, and beautification.

Successful tree planting involves a series of steps, each one dependent upon the others. This publication and *Tree Planting: Planning*, Pm-1676, discuss the steps for successful tree planting, including (1) planning, (2) site preparation, (3) selecting and ordering planting stock, (4) caring for the nursery stock, (5) planting methods, and (6) plantation maintenance.

## Caring for Nursery Stock

In Iowa, the ideal time to plant seedlings is between late March and mid-May, depending on weather. Plant early to aid sufficient root system development and to avoid the stress of hot and dry weather. If soil conditions are suitable, about 40° F and moist, but not wet, plant the nursery stock as soon as received from the nursery.

If possible, inspect for quality before accepting plant material from a nursery. Nursery stock is packaged and shipped in wax coated boxes, in plastic bags in larger paper bags, or rolled in plastic or moisture-resistant paper. Examine the containers for damage. Inspect the stock for dry roots, swelled or opened buds, mold on needles or stems, and physical damage such as broken stems or stripped roots. If stock is damaged, return it to the nursery for replacement or refund.

Plant the stock as soon as possible; survival rate generally decreases as time between shipping and planting increases. If planting must be delayed for a week or less, store the stock in a cool, dark, damp place such as a cellar, milk house, or unheated building. Make sure the root systems of the seedlings remain moist. This may require resetting packing material or turning trees packed in plastic inside paper bags daily. If it is necessary

to hold trees for more than a week, keep them in cold storage (35 to 40° F) and make sure the root systems of the seedlings remains moist.

“Heeling in,” or planting seedlings in shallow soil pits for long-term storage, is not recommended. It causes significant damage to the fragile root system. Do not immerse seedlings in water for storage. Planting as soon as possible is the best course of action.

Root pruning may be beneficial in some cases. After planting, new root initiation often occurs at the site of wounding; clean, fresh wounds may provide a more vigorous root system. If the plants have minimal roots, however, root pruning may result in greater mortality. For root pruning to be beneficial, the plant must have a sufficient number of roots at least 1/16 inch in diameter (at least five to six for oak, ash, and walnut); the roots remaining after pruning must be at least four inches in length. Seedlings with more roots compared to the shoot survive better and grow faster than seedlings with inadequate root systems compared to the shoot.

When moving seedlings from storage to the planting site, take only the number of seedlings that you can plant in half a day or less. Keep roots moist; avoid exposure to high temperatures or drying conditions. Soak roots in water for two to three hours before planting. Carry trees in buckets with roots covered with muddy water or one of the hydrophilic gels or moisture enhancers. Use water in the boxes or containers provided on tree planters to keep the root systems moist until the seedling is in the ground. Leave containers in the shade until the seedlings are removed for planting. Remove only what can be planted in one to two hours.



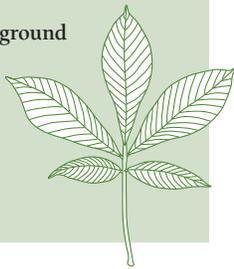


## Planting Methods

There are two basic tree planting methods. Hand planting is appropriate when planting a small number of seedlings or if the site is not conducive to equipment operation. Planting 500 seedlings is a good day's work if using this method. For larger areas that lend themselves to equipment operation, tree transplanters or planting machines facilitate the task. Tree planters can plant from 500 to 1,000 or more trees per hour.

### Tree Planting Rules

- Plant trees one inch deeper than they grew in the nursery
- Make sure hole or slit is large enough for the tree
- Avoid J-roots when planting
- Plant trees straight
- Keep roots cool and moist until in the ground
- Arrange roots naturally
- Firm the soil around the root system
- Plant when soil conditions are right
- Plant early rather than late

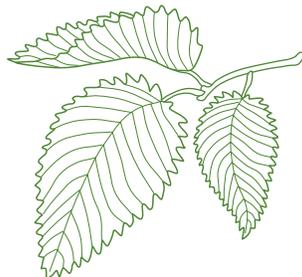


### Hand Planting

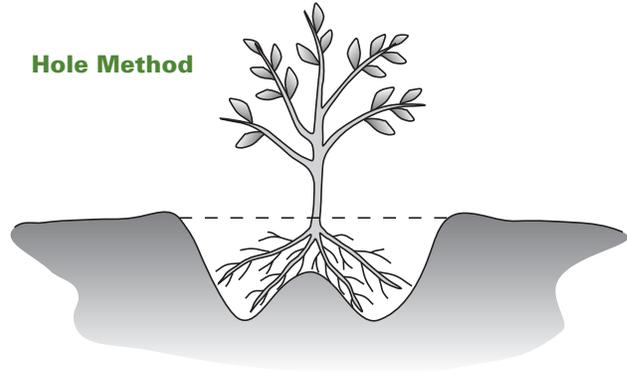
Hand tools used for tree planting include power augers, hoe dads, planting bars, shovels, spades, tree bars, and any other tools that make a suitable opening for the planting stock.

There are two basic techniques for hand planting: the hole method and the slit method. The hole method may be the best planting method because the roots are spread over a larger soil area, resulting in greater uptake of water and nutrients. Also, the soil placed around the root system is fine, ensuring better soil to root contact.

Dig a hole in the soil large enough for the root system. Spread out the roots and pack the soil firmly around them in order to exclude air. The use of power augers makes hand planting easier. A slight variation uses a shovel, spade, or hoe dad to dig a hole with a straight side. Place the tree along this side and replace the soil. If trees are to be watered, make a dish around the seedling to facilitate the watering.

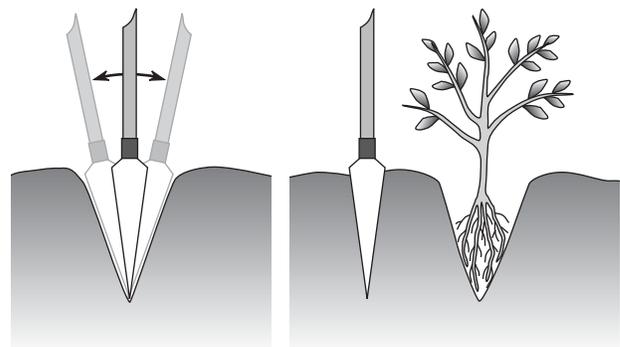


### Hole Method

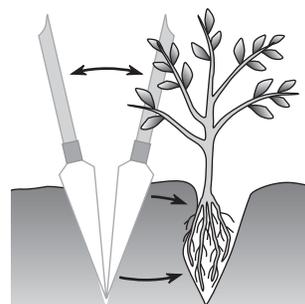


The slit method is faster than the hole method. Using a planting bar, shovel, or spade, make a vertical slit in the soil. Insert the roots of the plant and close the slit at both the top and bottom. When planting bigger stock with large root systems, the shovel or spade may be better sized for slit planting than the tree planting bar. Do not crowd tree roots. Firmly close the slit around the root system to prevent drying. The roots should fall straight down in the opening to avoid J-rooting. J-roots are roots that bend in the planting hole back towards the soil surface. Exposed roots act like a wick, removing moisture from the soil surrounding the plant. J-roots may not develop properly, causing plant stress.

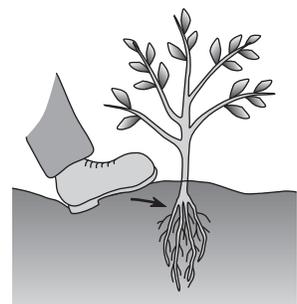
### Slit Method



#### Step 1



#### Step 2

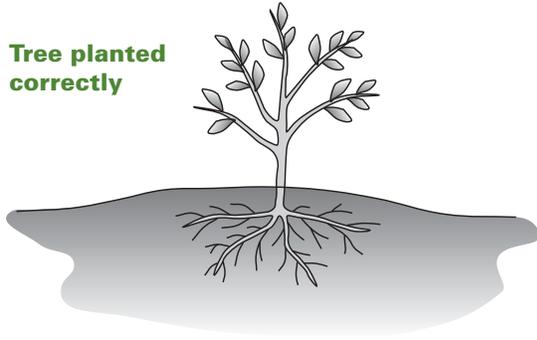


#### Step 3

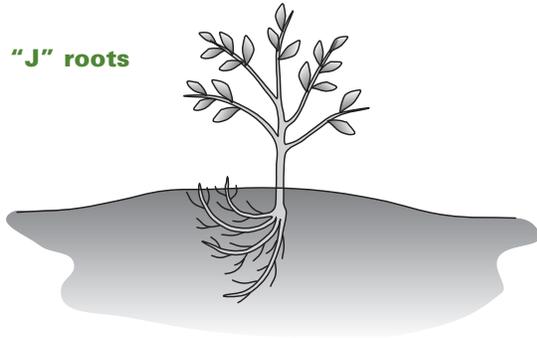
#### Step 4



**Tree planted correctly**



**"J" roots**



ing or marking device to determine when to plant each tree. It is a good idea to have a person walk behind the tree planter to straighten crooked trees and make sure the slits have been closed.

## Plantation Maintenance

Iowa soils and climate provide an ideal environment for intense competition from weeds. Lack of weed control is the primary reason for planting failure. Effective weed control enhances tree survival and growth, and results in faster conversion of a tree planting to a woodland.

Methods for controlling competing vegetation include mowing, mulching, mechanical cultivation, and chemical (herbicide) use. Most plantings require three to five years of weed control. After this period, trees are taller than other vegetation and have developed sufficient root systems to compete with other plant materials on the site. The period of weed control may need to be longer on poor sites or when using slower growing species.

Weed control should cover the same area as site preparation. An area at least three feet in diameter around each tree is required. Larger weed control areas (up to five to six feet in diameter) encourage more rapid root system occupation of the site. Weeds either can be controlled around individual plants or in three- to six-foot-wide strips along the rows of a plantation.

## Mowing

Mowing by itself is the poorest form of weed control. It stimulates increased root growth of grasses and does not control the roots of competing vegetation. Close mowing around trees often results in basal damage or main stem wounding. Mowing is often used in combination with other methods to control the height of competing vegetation, identify tree rows, and reduce rodent habitat in fall and winter.



## Machine Planting

A tree planter is a machine attached to a tractor that makes a slit in the soil. Seedlings, transplants, or cuttings are placed in the slit. Packer wheels close the slit and firm the soil around the root system. Tree planters may be loaned or rented from County Conservation Boards,

DNR Wildlife Units, or forestry service providers. A planter commonly available is the "Forester," which is designed to plant pine on level, sandy sites. It is capable of planting on tougher sites, but its maximum depth is 10 inches. When planting larger stock (hardwoods) a larger planter must be used. Within the past five years, larger tree planters have become more available in the state.

Mechanical tree planters are only as good as their operators. Adjustments may be required for depth and firmness of packing around the seedlings. On slopes, machines must be leveled to the slope to avoid plowing; always plant on the contour to avoid soil erosion. Correct spacing of trees can usually be achieved by adjusting the speed of the tractor, or by using a measur-



### **Mulches**

Organic mulching is an excellent method of weed control. Four to six inches of mulch material (wood chips, sawdust, ground bark, etc.) provides weed control for three to five years, conserves moisture around the plant, reduces temperature extremes, and provides nutrients as it decays. The availability and handling problems of mulches prohibit their application to large scale plantings. If it can be done, however, mulching provides excellent weed control and other benefits.

Sawdust or other finely ground wood products tie up nitrogen as they decay; to reduce this problem, avoid mixing soil with the mulch. Mulches from black walnut should be composted for at least one year to reduce complications from juglone, a growth inhibitor found in walnut.

### **Mechanical Cultivation**

Shallow cultivation works well for weed control. Cultivating often enough to control weeds without causing damage to the trees' expanding root systems is essential. Be aware that cultivation may stimulate the germination of dormant seeds as they are brought closer to the surface.



The "Weed Badger" is an example of a piece of equipment designed for cultivation of tree plantations. A light disk or harrow can be used to control weeds mechanically as well.

### **Chemical (herbicide) Use**

Several chemicals can be used to control grass and weed competition.

Good initial site preparation is the key for success with pre-emergent herbicides.

There are some herbicides that can be used to control established or existing vegetation around trees. These generally are used to rescue a plantation from competition. For more information on herbicides and their use, obtain the Iowa DNR publication *Weed Control for Tree and Shrub Seedlings* from Forestry Extension at Iowa State University, your district forester, or the Iowa DNR.



Prepared by Paul H. Wray, extension forester.

File: Forestry 2

#### **... and justice for all**

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.